83

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/063,834	05/16/2002	Bradley Wyman	INSGHT1010	6263

26379 7590 06/03/2005

DLA PIPER RUDNICK GRAY CARY US, LLP
2000 UNIVERSITY AVENUE
E. PALO ALTO, CA 94303-2248

EXAMINER	
KRONENTHAL, CRAIG W	

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 06/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/063,834	WYMAN ET AL.	
	Examiner	Art Unit	
	Craig W. Kronenthal	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-58* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27,30-53 and 55-58* is/are rejected.

7)☒ Claim(s) *1,7,12-14,26,28,29,42,46,47 and 54* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 May 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities:

- Equations 3, 4, and 5 should be reformatted.

Appropriate correction is required.

Claim Objections

Claim 1 is objected to because of the following informalities:

- On line 21 of claim 1, "the memory" should be replaced with "a memory" since no instance of memory has been previously recited in the claim.
- On line 29 of claim 1, "N" is not previously defined. However, it is understood to be the predetermined number referred to in step (f). If this is indeed the case, then "(N)" should follow "predetermined number" found in line 26.

Appropriate correction is required.

Claims 7 and 42 are objected to because of the following informalities:

- On line 2 of both claims 7 and 42, "the selected corner points" should be replaced with "selected corner points" since "corner points" are not recited in claim 1 or 36, respectively.

Appropriate correction is required.

Claim 47 is objected to because of the following informalities:

- Claim 47 as written is incorrect because it is dependent upon itself. It is believed that claim 47 should depend on claim 46.

Appropriate correction is required.

Claim 54 is objected to because of the following informalities:

- Claim 54 as written is incorrect because it is dependent on claim 55, which has not been previously recited. It is believed that claim 54 should instead depend on claim 53.

Appropriate correction is required.

Claims 12-14, 26, and 46 are objected to because of the following informalities:

- The equations in each of these claims do not have an equal signs.
- In addition the equation of claim 26 should be reformatted.

Appropriate correction is required.

A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general,

applicant's sequence will not be changed. See MPEP § 608.01(n). Claims 13, 14, 18, and 49 are separated by claims without the same dependency.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites the limitation "calculating correspondence" in line 2. There is insufficient antecedent basis for this limitation in the claim. It is believed that calculating correspondence refers to the step of calculating quality of alignment as recited in claim 1.

Claims 12-16, 36, 46, and 47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The variables L2, L3, L4, L5, M, Q, and L are not clearly defined.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4-27, 30, 31, 36, 39-53, and 55-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Szeliski et al. (PN 5,611,000) and Roche et al. (PN 6,539,127). (hereinafter Szeliski and Roche respectively)

Regarding Claim 1: Szeliski et al. (5,611,000) discloses a method for registering a plurality of image sets, wherein each of the plurality of image sets comprises at least one image, and wherein each of the plurality of image sets contain spatially overlapping areas of an imaged subject with at least one of the remaining plurality of the image sets, the method comprising:

- selecting a reference image set and an evaluation image set from said plurality of image sets, wherein the evaluation image set is to be aligned with the reference image set [Figure 14. Images 1 (100) and 2 (101) are the reference and evaluation images respectively (col. 10 lines 22-23).];
- selecting a methodology for comparing of the registration between the reference image set and the evaluation image set [Figure 14. The image comparator (920)

is selected for comparing the reference image (100) and the evaluation image (101) (col. 10 line 19).];

- selecting one or more point locations on the evaluation image set for tracking image movement [Figure 4. Control vertices (201-263) belonging to the evaluation image (101) are used for tracking image movement (col. 23-25).];
- selecting one or more fixed reference points for comparison with the one or more point locations on the evaluation image set [Figures 5 and 6. A pixel (130) at a fixed or predetermined position in the first image (100) is selected so that it may be used in finding the corresponding pixel in the second image (101) (col. 7 line 61-col. 8 line 1).];
- selecting type of transformation to apply to the evaluation image set for aligning the evaluation image set with the reference image set [Affine transformation could be used to displace pixels of the second image (101) (col. 5 lines 23-25).];
- a) calculating quality of alignment between the reference image set and the evaluation image set using a selected quality of alignment methodology [The cost function (Equation 6, col. 5 lines 57-67) calculates the quality of alignment (col. 7 lines 52-53).];
- b) calculating a location value (C) from one or more points on the evaluation image set with respect to the selected one or more fixed reference points and storing the calculation in the memory [Equation 6. The result of the cost function (E), which represents the location value (C), is a value relating a selected pixel on the derived image to a corresponding fixed reference pixel on the actual

image (col. 5 lines 49-56). The memory (42) is used to store the steps and therefore stores the new locations (col. 4 lines 16-18).];

- c) calculating a next transformation to apply to the evaluation image [Figure 14. The error integrator (940) calculates the vertex gradients (904) to be used for transforming the second image (101) (col. 10 lines 48-52).];
- d) applying the transformation to at least a subset of the evaluation image set [Figures 4 and 14. The vertex displacer (950) uses the vertex gradients (904) to displace the control vertices (201-263) thereby applying the transformation to the second image (101) (col. 10 lines 53-57).];
- e) calculating a convergence value (V) for the current iteration (i), and storing the convergence value to the memory [The convergence value is the calculated rate of change, or gradient, of the cost (col. 9 lines 37-42).];
- f) performing steps (a), (b) (c), (d) and (e) until at least a predetermined number of correspondence calculation iterations have been performed; and
- g) repeating steps (a), (b), (c), (d), and (e) if a total number of iterations (i) performed < N and the convergence value (V) < (t), wherein (t) is a threshold value.

Szeliski does not disclose step f.

However, Roche discloses a method of automatic image registration wherein image transformation is repeated at least a predetermined number of times (col. 9 lines 3-5).

Szeliski does not disclose step g either.

However, Roche discloses a method of automatic image registration wherein image transformation is repeated as long as the convergence value remains below a threshold, referred to as a convergence criterion (col. 7 lines 57-67).

Szeliski teaches determining the final transformation iteration by comparing the cost with a desired minimum (col. 10 lines 5-6). It would be obvious to one of ordinary skill in the art to modify this teaching to use the convergence value instead of cost as taught by Roche, especially since Szeliski already computes the convergence value (see step d). One would be motivated to make this modification to avoid making excessive transformations. In addition, it would be obvious to one of ordinary skill in the art to use a predetermined number of iterations as another determination for ending the transformation iterations. One would be motivated to use a large predetermined number in addition to the determination on convergence value to end the iterations in case a convergence could not be reached in a timely manner.

The analogous arguments of claim 1 are applicable to claims 36 and 55-58.

Regarding Claim 4: Szeliski discloses the method for registering a plurality of image sets according to Claim 2, wherein the image sets to be registered are capable of differing in at least one of temporally, modality, acquisition orientation, and dimensionality [The reference image (100) and evaluation image (101) differ temporally (col. 4 lines 4-6).].

The analogous arguments of claim 4 are applicable to claim 39.

Regarding Claim 5: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein the image sets to be registered are capable of differing in at least one of temporally, modality, acquisition orientation, and dimensionality [The reference image (100) and evaluation image (101) differ temporally (col. 4 lines 4-6).].

The analogous arguments of claim 5 are applicable to claim 40.

Regarding Claim 6: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein the selecting of point locations includes selecting corner points of the evaluation image set as the selected location points [Figure 8. The control vertices (216, 217, 223, 224) are in the corners of a patch (314') in the evaluation image (101) (col. 8 lines 33-35). It is possible that the patch (314) could be the entire evaluation image (101). The positions of the control vertices are initially selected for feature tracking (col. 12 lines 35-45) and may be corners (col. 12 line 40).].

The analogous arguments of claim 6 are applicable to claim 41.

Regarding Claim 7: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, further including using the selected corner points of the evaluation image set before the initial transformation as the fixed reference locations [Figure 8 shows that the corner points used as the control vertices (216, 217, 223, 224) on the evaluation patch (314'), correspond to the corner points, which are selected as

the fixed points, of the reference patch (314) belonging to the reference image (100) (col. 12 lines 35-45).].

The analogous arguments of claim 7 are applicable to claim 42.

Regarding Claim 8: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein the location value (C) is an average distance between the one or more selected point(s) at the current iteration and the one or more fixed reference locations [Equation 6. The result of the cost function (E), which represents the location value (C), gives the average distance between a selected pixel on the derived image and a fixed reference pixel on the actual image at a current iteration (col. 5 lines 49-52).].

The analogous arguments of claim 8 are applicable to claim 43.

Regarding Claim 9: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein the convergence value (V) is calculated from the location values (C) [Equations 19 and 20. The convergence value (V) is the rate of change of E, which represents the location value (C) (col. 9 lines 36-42).].

The analogous arguments of claim 9 are applicable to claim 44.

Regarding Claim 10: Szeliski discloses the method for registering a plurality of image sets according to Claim 9, wherein location value (C) is low pass filtered to remove

noise [Low pass filtering is done to the image (100) as a pre-processing step thereby removing noise from the location value (C) (col. 4 lines 41-46).].

Regarding Claim 11: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein location value (C) is low pass filtered to remove noise [Low pass filtering is done to the image (100) as a pre-processing step thereby removing noise from the location value (C) (col. 4 lines 41-46).].

The analogous arguments of claim 11 are applicable to claim 45.

Registering Claim 12: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein the convergence value (V) for each iteration (i) is defined as shown by the equation given in claim 12 [The horizontal and vertical flow gradients represent the convergence value and are defined by equations 19 and 20, which correspond to claim 12's equation (col. 9 lines 41-50).]

The analogous arguments of claim 12 are applicable to claim 46.

Regarding Claim 13: Szeliski discloses the method for registering a plurality of image sets according to Claim 3, wherein the convergence value (V) for each iteration (i) is defined as shown by the equation given in claim 13 [The horizontal and vertical flow gradients represent the convergence value and are defined by equations 19 and 20, which correspond to claim 13's equation (col. 9 lines 41-50).]

Regarding Claim 14: Szeliski discloses the method for registering a plurality of image sets according to Claim 8, wherein the convergence value (V) for each iteration (i) is defined as shown by the equation given in claim 14 [The horizontal and vertical flow gradients represent the convergence value and are defined by equations 19 and 20, which correspond to claim 14's equation (col. 9 lines 41-50).]

Regarding Claim 15: Roche discloses the method for registering a plurality of images sets according to Claim 14, wherein convergence is obtained when absolute value of (V) is less than or equal to t for at least L3 of the last L4 iterations such that L3 is less than or equal to L4 [The test module (9) terminates the iterations of the method when a maximum predetermined number of iterations are made (col. 9 lines 50-55). It would be obvious to modify the test module (9) to also set a minimum number of iterations to be processed. One would be motivated to make this modification to improve the quality of alignment when more computational processing and time are affordable.].

The analogous arguments of claim 15 are applicable to claim 47.

Regarding Claim 16: Roche discloses the method for registering a plurality of images sets according to Claim 1, wherein convergence is obtained when absolute value of (V) is less than or equal to t for at least L3 of the last L4 iterations such that L3 is less than or equal to L4 [The test module (9) terminates the iterations of the method when a maximum predetermined number of iterations are made (col. 9 lines 50-55). It would be obvious to modify the test module (9) to also set a minimum number of iterations to be

processed. One would be motivated to make this modification to improve the quality of alignment when more computational processing and time are affordable.].

Regarding Claim 17: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein the transformation of the evaluation image set is one of affine, rigid, deformable, and perspective [Affine transformation is used (col. 5 lines 23-25).].

The analogous arguments of claim 17 are applicable to claim 48.

Regarding Claim 18: Szeliski discloses the method for registering a plurality of image sets according to Claim 4, wherein the transformation of the evaluation image set is one of affine, rigid, deformable and perspective [Affine transformation is used (col. 5 lines 23-25).].

The analogous arguments of claim 18 are applicable to claim 49.

Regarding Claim 19: Roche discloses the method for registering a plurality of image sets according to Claim 1, wherein the transformation applied to the evaluation image set is determined by an optimization method [Figure 1. The calculation module (8) determines the registration transformations utilizing an optimization algorithm (col. 8 lines 45-49).]. It would be obvious to one of ordinary skill in the art to modify Szeliski's vertex adjuster with an optimization algorithm because the cost function (equation 6)

can have many local optimal solutions (col. 6 lines 1-5) and one would be motivated to choose the most efficient solution.

Regarding Claim 20: Roche discloses the method for registering a plurality of image sets according to Claim 19, wherein calculating correspondence further includes at least one of a Powell's method optimizer, a steepest gradient descent optimizer, a LBFGS optimizer, a Levenberg-Marquardt optimizer, a conjugate gradient optimizer, and a quasi-Newton optimizer [The optimizer algorithm could be the Powell type (col. 8 lines 48-57).].

Regarding Claim 21: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein an image set comprises one or more images [Figure 14. A first image (100) and second image (101) are used for registration (col. 10 lines 22-23).].

The analogous arguments of claim 21 are applicable to claim 50.

Regarding Claim 22: Szeliski discloses the method for registering a plurality of image sets according to Claim 21, wherein the image set comprises data relating to functional measurements [The image set may include images from medical scanners (col. 3 line 67 – col. 4 line 3). It is well known that images from medical scanners offer data with functional measurements used for many different diagnostic procedures.].

Regarding Claim 23: Szeliski discloses the method for registering a plurality of image sets according to Claim 21, wherein the image set comprises data relating to anatomical data [The image set may include images from medical scanners, which inherently contain anatomical data (col. 3 line 67 – col. 4 line 3).].

Regarding Claim 24: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein the image set comprises data relating to functional measurements [The image set may include images from medical scanners (col. 3 line 67 – col. 4 line 3). It is well known that images from medical scanners offer data with functional measurements used for many different diagnostic procedures.].

The analogous arguments of claim 24 are applicable to claim 51.

Regarding Claim 25: Szeliski discloses the method for registering a plurality of image sets according to Claim 1, wherein the image set comprises data relating to anatomical data [The image set may include images from medical scanners, which inherently contain anatomical data (col. 3 line 67 – col. 4 line 3).].

The analogous arguments of claim 25 are applicable to claim 52.

Regarding Claim 26: Szeliski discloses the method for registering a plurality of image sets according to Claim 11, wherein the low-passed filter is defined as given by the equation in claim 26, wherein L1 is the length of the low-pass filter [The location value

(C) is inherently altered according to the equation as shown in claim 26 when boxcar filtering is utilized to reduce the impact of noise (col. 4 lines 44-46).].

Regarding Claim 27: Roche discloses the method for registering a plurality of image sets according to Claim 1, wherein the calculation of the convergence threshold (t) is dynamically determined based on the data [The convergence threshold is part of the optimization algorithm and therefore would be dynamically determined based on the data to optimize the registration (col. 7 lines 64-66).].

The analogous arguments of claim 27 are applicable to claim 53.

Regarding Claim 30: Roche discloses the method for registering a plurality of image sets according to Claim 1, wherein the quality of alignment is voxel based [Accuracy is calculated with respect to voxel size (col. 5 lines 10-12).]. It would be obvious to one of ordinary skill in the art to modify Szeliski to create a spline of voxels and therefore determining quality of alignment based on corresponding voxels (col. 5 lines 58-62). Furthermore, one would be motivated to make this modification to improve alignment accuracy.

Regarding Claim 31: Roche discloses the method for registering a plurality of image sets according to Claim 30, wherein the voxel based quality of alignment is further based on intensity of pixels of the image [The correlation ratio, which is used to

determine the quality of alignment, is based on random variables representing intensity components of the images being aligned.

Claims 2, 3, 32, 33, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szeliski and Roche in view of Viola et al. ("Alignment by Maximization of Mutual Information"). (hereinafter Viola)

Regarding Claim 2: Szeliski and Roche disclose the method for registering a plurality of image sets according to Claim 1, but do not disclose the step of calculating a quality of alignment including mutual information.

However, Viola discloses an alignment method wherein calculating correspondence further includes calculating Mutual Information between the reference image set and the evaluation image set [A maximum of the mutual information of a model u (evaluation image) and image v (reference image) is calculated to estimate the transformation (p. 17, Section 2.1, lines 1-3).]. It would be obvious to one of ordinary skill in the art to modify the calculating of alignment quality with mutual information since Szeliski discloses the desire to perform image registration without a priori knowledge (col. 2 lines 52-55). Furthermore one would be motivated to make this modification to align medical images when one image is an MRI and the other is a CT image.

The analogous arguments of claim 2 are applicable to claim 37.

Regarding Claim 3: Viola discloses the method for registering a plurality of images sets according to Claim 2, wherein the Mutual Information calculation further includes Stochastic sampling to compute the Mutual Information [The maximum of mutual information uses a stochastic sampling (p. 18, Section 2.3.1, lines 1-2).].

The analogous arguments of claim 3 are applicable to claim 38.

Regarding Claim 32: Viola discloses the method for registering a plurality of image sets according to Claim 31, wherein Mutual Information is utilized to determine quality of alignment [The mutual information is maximized to determine the transformation that yields the best quality of alignment (p. 17, Section 2.1, lines 1-3).]. It would be obvious to one of ordinary skill in the art to modify Roche's correlation ratio to utilize mutual information as is well known in the art of image registration.

Regarding Claim 33: Viola discloses the method for registering a plurality of image sets according to Claim 32, wherein Mutual Information further includes stochastic approximation [The maximum of mutual information uses a stochastic sampling (p. 18, Section 2.3.1, lines 1-2).].

Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szeliski and Roche in view of Moshfeghi (PN 5,633,951).

Regarding Claim 34: Szeliski and Roche disclose the method for registering a plurality of image sets according to Claim 1, but do not disclose the use of features to determine the quality of alignment. However, Moshfeghi discloses an image registration method, wherein the quality of alignment is feature based [The contours, representing features, of the images to be registered are extracted creating surfaces that are used for alignment (col. 2 lines 45-51).]. It would be obvious to one of ordinary skill in the art to modify Szeliski's quality of alignment determination to use features of the image to further improve the accuracy of image registration.

Regarding Claim 35: Moshfeghi discloses the method for registering a plurality of image sets according to Claim 34, wherein the feature based quality of alignment is further based on edges extracted from the image [The contours, or edges, of the images to be registered are extracted creating surfaces that are used for alignment (col. 2 lines 45-51).].

Allowable Subject Matter

Claims 28, 29, and 54 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Miller et al. (PN 6,009,212) is cited for teaching image registration by selecting points and iteratively transforming an image until a convergence threshold or number of iterations is reached.
- Suri (PN 6,718,055) is cited for teaching image registration by repeating transformations and using mutual information.
- Defaux et al. (US 2002/0186425) is cited for teaching image registration using multiple sweeps of images to be aligned.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig W. Kronenthal whose telephone number is (571) 272-7422. The examiner can normally be reached on 8:00 am - 5:00 pm / Mon. - Fri..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (571) 272-7414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

5/27/05
CWK

AMELIA M. AU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600